08

AVERAGE

Average

The average is nothing but the sum of all observations divided by the number of observations. This is also known as arithmetic mean of the given observations or average value or mean value.

i.e.

$$\text{Average(A)} = \frac{\text{Sum of given observations/Quantities}}{\text{Number of observations/Quantities}}$$

Some key terms:-

- Average of a given term is always lies in range at given data.

  i.e.

  Lowest Quantity ≤ Average ≤ Greatest quantity
- If the quantities of given data are equal then the average will also be the same as quantities.

  i.e. Average = Greatest / Lowest quantity

  Value of all quantities = Average

  (No greatest or lowest exist)
- If '0' is one of the quantities of a given data, then that '0' will also be included while calculating average.

Average Speed

If a person cover a certain distance at a speed of A km/h and again cover the same distance at a speed of B km/h, then the average speed during the whole journey will be

$$\frac{2AB}{A+B}$$

If distance 'A' is covered with speed a , distance 'B' is covered with speed b and distance 'c' is covered with speed c, then for the whole journey:

$$\text{Average speed} = \frac{A+B+C+\ldots\ldots}{\frac{A}{a}+\frac{B}{b}+\frac{C}{c}+\ldots\ldots}$$

Helping point:-

Sum of arithmetic progression whose first term is "a" last term is $[a+(n-1)d]$.

$$S_n = \frac{n}{2}\times[2a+(n-1)d]$$

Sum of geometric progression whose first term is [a], last term is $[ar^{n-1}]$ and common ratio is (r)

$$= \frac{a[r^n-1]}{r-1} \quad \text{if } r>1$$

$$= \frac{a[1-r^n]}{1-r} \quad \text{if } r<1$$

* Sum of first n natural no. = $\frac{n(n+1)}{2}$

  Average of first n natural no. = $\frac{(n+1)}{2}$
* Sum of squares of first n natural no.

  = $\frac{n(n+1)(2n+1)}{6}$

  Avg. of squares of first n natural no.= $\frac{(n+1)(2n+1)}{6}$
* Sum of cubes of first n natural no. = $\left[\frac{n(n+1)}{2}\right]^2$

  Average of cubes of first n natural = $\frac{n(n+1)^2}{4}$
* Sum of first n natural odd no. = n^2

  Avg. of first n natural odd no. = n
* Sum of first n natural Even no. = $n(n+1)$

  Average of first n natural Even no. = $(n+1)$

Examples

1. Find the average of first 73 numbers:

   (a) 37 (b) 36

   (c) 73 (d) 72

Sol. (a) 1 + 2 + 3 ------- + 72 + 73

$$= \frac{n(n+1)}{2}$$

= 2701

$$\text{Average} = \frac{2701}{73} = 37$$

Alteranate:- Average $= \frac{n+1}{2} = 37$

2. The average of 47 numbers is 459. If each of the number is divided by 17, find the new average:

   (a) 27 (b) 28

   (c) 21 (d) 26

Sol. (a) $\frac{459}{17} = 27$,

ıe no. are divided
an arbitrary no.
ılso get divided or
ingly.

of 107 number is
of the number is
13, find the new
average:

(a) 439 (b) 429

(c) 419 (d) 423

Sol. (b) 33 × 13 = 429

Hence, Answer will be divided 3 and 11

4. The average of 11 result is 50. If the average of the first six result is 49 and that of the last six is 52, the sixth result is :

(a) 48 (b) 50

(c) 52 (d) 56

Sol. (d)

$$\frac{A+B+C+D+E+F+G+H+I+J+K}{11}$$

The average of 1st 6 result = 49

The average of the last 6 result = 52

The Average of total result is= 50

6^{th} result = (52 × 6 + 49 × 6) – (11 × 50) = 56

5. The average of 50 numbers is 45. The average of 50 number and 3 new numbers is 51. The average of the three new number will be :

(a) 153 (b) 151

(c) 157 (d) 351

Sol. (b) Total of 3 Numbers

= (50 + 3) × 51– 50 × 45

= 453

The average of 3 new result will be $=\frac{453}{3}=151$

6. The average of salary of 20 workers in an office is Rs.2100 per month. If the manager's salary is added, the average becomes Rs.2200 per month. The manager's annual salary is (in Rs.) :

(a) 4200 (b) 4000

(c) 48,000 (d) 50,400

Sol. (d) manager's salary = 2200 + 20(2200 – 2100) = 4200

Then manager's annual salary = 4200 ×12 = Rs. 50,400

7. In a class, there are 10 students at the age of 15 years, 15 at the age of 16 years and 5 at the age of 14 years. What is the average age of a student:

(a) $15\frac{2}{3}$ (b) $15\frac{1}{3}$

(c) $14\frac{3}{4}$ (d) 15

Sol. (b)Average age of a student

$$=\frac{10'\ 15+15'\ 16+5'\ 14}{10+15+5}$$

$$=\frac{460}{30}=15\frac{1}{3}$$

8. The average age of 54 boys in a class is 21 years. If the 'lecture-spell check's age is included the average age of the boys and lecturer becomes 21 year 6 month. What is the lecturer's age :

(a) 48 years 3 month

(b) 48 year

(c) 47 year 6 month

(d) 48 year 6 month

Sol. (d) Lecturer's age is = 21.5 + 54(21.5 – 21) = 48.5 years

9. A family consist of grandparents, parent and three children. The average age of the grandparents is 67 years, that of the parents is 35 years and that of the children is 6 years. What is the average age of the family?

(a) $28\frac{4}{7}$ (b) $31\frac{5}{7}$

(c) $32\frac{1}{7}$ (d) $32\frac{5}{7}$

Sol. (b) Required average

$$=\frac{67'\ 2+35'\ 2+6'\ 3}{2+2+3}$$

$$=31\frac{5}{7}\text{ years}$$

10. A library has an average of 510 visitors on friday and 240 on other days. The average number of visitors per day in a month at 30 days begining with a friday is :

(a) 250 (b) 276

(c) 280 (d) 285

Sol. (d) If the month starts with a Friday, then there will be 5 Friday in the month

Required average

$$=\left(\frac{510'\ 5+240'\ 25}{30}\right)=\frac{8550}{30}$$

= 285

11. A student was asked to find the arithmetic mean of the following 12 numbers:

3, 11, 7, 9, 15, 13, 8, 19, 17, 21, 14 and x

He found the mean to be 12. The value of x will be.

(a) 3 (b) 7

(c) 7 (d) 31

Sol. (b) mean

$$=\frac{3+11+9+7+15+13+8+19+17+21+14+x}{12}$$

According to question,

$$\frac{137+x}{12}=12$$

$\therefore$ 137 + x = 144

$\therefore$ x = 144 – 137 = 7

12. The average height of 16 boys in a class is 50.25 inches and 8 boys is 45.15 inches. Find the average height of all boys in the class :

(a) 47.55 inches

(b) 48 inches

(c) 48.55 inches

(d) 49.25 inches

Sol. (c) The required average height

$$=\left(\frac{50.25'\ 16+45.15'\ 8}{16+8}\right)$$

score of a cricketer is 38.9 runs. If the st three mathes is verage for the last :

(a) 33.25 (b) 33.5

(c) 34.25 (d) 35

Sol. (c) The average of last 2 games

$$= \frac{5\times 38.9 - 42\times 3}{2} = \frac{68.5}{2}$$

$= 34.25$

14. The average runs of a cricket player of 5 innings was 62. How many runs must he make in his next innings so as to increase his average of runs by 4?

(a) 88 (b) 87

(c) 86 (d) 84

Sol. (c) The runs to be scored by him in 6^{th} innings

$= 62 + 6\times 4 = 86$

15. In the first 20 overs of a cricket game, the run rate was only 3.2. What should be the run rate in remaining 30 overs to reach the target 262?

(a) 5.6 (b) 7.2

(c) 6.6 (d) 8.8

Sol. (c) Score of 20 overs

$= 3.2\times 20 = 64$

Score of 30 overs

$= 262 - 64 = 198$

Average of remaining overs

$$= \frac{198}{30} = 6.6$$

16. If the average of first 75 innings is 35. How much should he scored in his 76 innings to increase his average by 2 runs?

(a) 186 (b) 189

(c) 187 (d) 188

Sol. (c) Score of 76^{th} innings

$= 35 + 2\times 76 = 187$

17. A car travels from Delhi to Agra at the rate of 20km/hour and from Agra to Delhi at the rate of 30km/hour. What is average speed whole journey ?

(a) 18km/hr (b) 20km/hr

(c) 25km/hr (d) 24km/hr/.

Sol. (d) Average speed

$$= \frac{2(20'\ 30)}{20+30} = 24 \text{ km/hr}$$

18. The average weight of five persons sitting in a boat is 38 kg. The average weight of the boat and the persons sitting in the boat is 52 kg. What is the weight of the boat ?

(a) 228 kg (b) 122 kg

(c) 232 kg (d) 242 kg

Sol. (b) Weight of the boat

$= 52\times (5+\text{Boat}) - 5\times 38$

$= 312 - 190 = 122$ kg

19. The mean of 50 observations was 36. It was found later that an observation 48 was wrongly taken as 23. The corrected (new) mean is :

(a) 35.2 (b) 36.1

(c) 36.5 (d) 39.1

Sol. (c) Total sum of 50 observations

$= 50 \times 36 = 1800$

The correct mean

$$= \frac{1800-23+48}{50} = \frac{1825}{50} = 36.5$$

20. The average of eight successive numbers is 6.5. The average of the smallest and the greatest numbers among them will be :

(a) 4 (b) 6.5

(c) 7.5 (d) 9

Sol. (b) $x + x + 1 + x + 2 + x + 3 + x + 4 + x + 5 + x + 6 + x + 7 = 6.5\times 8 = 52$

$\Rightarrow 8x + 28 = 52$

$\Rightarrow 8x = 52 - 28 = 24$

$\Rightarrow x = 3$

$\therefore$ Required average

$$= \frac{3+10}{2} = 6.5$$

21. The average temperature of the first 4 days of a week was 37°C and that of the last 4 days of the week was 41°C. If the average temperature of the whole week was 39°C, the temperature of the fourth days was :

(a) 38°C (b) 38.5°C

(c) 39°C (d) 40°C

Sol. (c) $M + T + W + TH = 4\times 37$

$= 148°C$.....(i)

$TH + F + S + S = 4\times 41$

$= 164°C$.....(ii)

$M + T +.....S + S = 7\times 39$

$= 273°C$.....(iii)

$\therefore$ Temperature of 4^{th} days

$= 148 + 164 - 273 = 39°C$

22. The average of five numbers is 7. When three new numbers are included, the average of the eight numbers becomes 8.5. The average of the three new numbers is :

(a) 9 (b) 10.5

(c) 11 (d) 11.5

Sol. (c) Total sum of new three no.

$= 8\times 8.5 - 5\times 7 = 68 - 35 = 33$

$$\therefore \text{ Required average} = \frac{33}{3} = 11$$

23. The average of x numbers is y and Avg. of y numbers is x. Then the average of all the numbers taken together is :

(a) $\frac{x+y}{2xy}$ (b) $\frac{2xy}{x+y}$

(c) $\frac{x^2+y^2}{x+y}$ (d) $\frac{x+y}{x+y}$

Sol. (b) Sum of x numbers = xy

Sum of y no. = xy

Required average

$$= \frac{xy + xy}{x+y} = \frac{2xy}{x+y}$$

24. 5 members of a team are weighed Respectively and calculation of their Avg. weight is done after each member is weighed. If the average weight increase by one kg each time, how much heavier is the last player than the first one ?

(a) 5 kg. (b) 8 kg.

(d) 20 kg.

x, weight$_1$ = x

+ 1, Weight$_2$ = $x + 2$

2, Weight$_3$ = $x + 4$

3, Weight$_4$ = $x + 6$

4, Weight$_5$ = $x + 8$

Hence, Difference between 5th and 1st = 8 kg.

25. The average score of a group of 20 students in a test was 52. The brightest 20% of them secured a average score of 80 and the dullest 25% a average score of 31. The mean score of remaining :

(a) 45% (b) 50%

(c) 51.4% (d) 54.6%

Sol. (c) $20\% = \frac{1}{5}$, $25\% = \frac{1}{4}$ L.C.M = 20

remaining average

$$= \frac{20 \times 52 - 20 \times \frac{1}{5}(80) - 20 \times \frac{1}{4}(31)}{(20 - 5 - 4 = 11)}$$

= 51.4

Exercise

1. Find the Average of first 13 odd no.
   (a) 13 (b) 11
   (c) 12 (d) 9
2. Find the Average of square of first 17 natural no.
   (a) 105 (b) 110
   (c) 115 (d) 100
3. The Average of 9 observations is 87. If the Average of first five observations is 79 and the Average of next three is 92. Find the 9th observation.
   (a) 111 (b) 112
   (c) 110 (d) 113
4. The Average of 7 data is 34 and the Average of first 3 data is 28 and the Average of next two data is 47. Find the average of last 2 data.
   (a) 15 (b) 20
   (c) 25 (d) 30
5. The average of 9 data is 79. The average of first two data is 75. and the average of next four data is 87. If the 8th data is 5 more than 7th data and 1 more than 9th data. Calculate 9th observation.
   (a) 69 (b) 70
   (c) 72 (d) 71
6. The Avarage of 8 number is 20. The avg. of first two number is 15.5 and the avg. of next 3 number is $21\frac{1}{3}$. If the 6th no. is 4 less than the 7th and 7 less then the 8th number Find the 8th number ?
   (a) 25 (b) 30
   (c) 35 (d) 20
7. The average age of 30 students of a class is 14 years 4 months. Due to admission of 5 new students the average becomes 13 years 9 months, while the age of the younger one among new 5 students is 9 years 11 months. Find the average of remaining four new students.
   (a) 10 (b) 31/3
   (c) 34/3 (d) 32/3
8. 9 Girls and 1 Boy go to a restaurant for lunch. If each girl spent ` 30 and boy spent ` 72000 more than the average of expenditures of all. Find the amount spent by the boy.
   (a) ` 80000 (b) ` 85000
   (c) ` 80030 (d) ` 90000
9. 3 years ago the average of family of five members was 17 years. A baby having been born the average age of the family is the same today. Find the age of the baby now.
   (a) 1 (b) 2
   (c) 3 (d) 4
10. The average age of mother, father and son was 42 years at the time of the marriage of the son. After 1 year an infant was born and after 6 years of marriage the average age of the family becomes 36 years. Find the age of the bride at the time of the marriage.
    (a) 25 (b) 20
    (c) 30 (d) 20
11. The average temp. of Monday, Tuesday, Wednesday and Thursday is 31°c and the average temp of Tuesday, Wednesday, Thursday and Friday is 29.5°c. If the average of temp on Monday was $37\frac{1}{2}\%$ more than the average temp of Friday. Find the temp. of Monday.
    (a) 21° C (b) 20° C
    (c) 22° C (d) 23° C
12. The average temp from Monday to Wednesday is 37°C while the average temp from Tuesday to Thursday is 34°C. The temp of Thursday is 4/5 times to that on Monday. Find the temp on Thursday.
    (a) 31° C (b) 36° C
    (c) 30° C (d) 35° C
13. There were 42 students in a Hostel due to admission of 13 new students expense of mess is increased by Rs. 30 per day while per day expenditure per student is reduced by Rs. 3. What was the original expenditure of mess per day.
    (a) 600 (b) 610
    (c) 630 (d) 620
14. There are 4 natural no. if average of any 3 no. is added with 4th no. 29, 23, 21 and 17 will be obtain find all 4 natural no.?
    (a) 18, 21, 6, 3
    (b) 21, 15, 12, 6
    (c) 18, 15, 12, 9
    (d) 21, 12, 9, 3
15. There are 3 natural no. if average of any 2 no. is added to the third no. 24, 20 and 18 will be obtained. Find all the natural no.
    (a) 6, 8, 17 (b) 9, 6, 16
    (c) 9, 5, 17 (d) 12, 6, 13
16. The average age of boys of a school is 12 years and of girls is 11 years. If the total no. of boys is 480. Then find the no. of girls if the average age of school 11 years 9 months.
    (a) 160 (b) 150
    (c) 140 (d) 170
17. If the bowling average of a bowler is 12.4 run per wicket. He takes 10 wickets in his next innings by giving 52 runs, due to this his bowling average is improved by 0.4 run per wicket. Find the total no. of wickets taken by him at present.
    (a) 150 (b) 160
    (c) 180 (d) 170
18. A batsman scores 87 runs in his 17^{th} innings due to this his average increased by 3 runs. Find his current average.
    (a) 35 (b) 40
    (c) 36 (d) 39

19. The bowling average of a bowler in certain matches is 12.4 runs per wicket. If he takes 5 wickets for 26 runs in his next innings then his bowling average becomes 12 runs per wicket. Find the wickets taken by him in the last inning.
(a) 90 (b) 85
(c) 80 (d) 95

20. The average weight of some students in a class is 43 kg. When 4 new students are included the average weight becomes 42.5 kg and the weight of those 4 students are 42, 36.5, 39 and 42.5 kg. Find the total no. of students in the class.
(a) 20 (b) 24
(c) 22 (d) 30

21. A batsman has an average of 30 runs in his 42 innings. The difference between his max. and min. score is 100. If these 2 innings are removed his average for 40 innings comes down to 28. What is his max. score?
(a) 120 (b) 110
(c) 125 (d) 130

22. The average of six innings of a player is 3.95. The average of two innings is 3.4 while the average of next two innings is 3.85. What is the average of last two innings:
(a) 4.5 (b) 4.6
(c) 4.9 (d) 4.8

23. A batsman in his 16^{th} innings makes a score of 60 and there by increase his average by 3. What is his average after 16^{th} innings ?
(a) 18 (b) 20
(c) 15 (d) 21

24. The average of five consecutive natural number is m. If the next three natural numbers are also included, how much more than m will the average of these numbers be?
(a) 1 (b) 1.5
(c) 1.4 (d) 2

25. The average of four positive integers is 72.5. The highest integer is 117 and the lowest integer is 15. The difference between the remaining two integers is 12. Which is the higher of these two remaining integer ?
(a) 70
(b) 73
(c) 85
(d) Can't be determined

26. The average of nine consecutive odd numbers is 53. The least odd number is :
(a) 22 (b) 27
(c) 35 (d) 45

27. The average of all odd numbers less than 100 is :
(a) 49.5 (b) 50
(c) 50.5 (d) 51

28. The average of seven consecutive positive integers is 26. The smallest of these integers is:
(a) 21 (b) 23
(c) 25 (d) 26

29. Total weekly emoluments of the workers of a factory is Rs.1534. Average weekly emolument of a worker is Rs. 118. The number of workers in the factory is :
(a) 16 (b) 14
(c) 13 (d) 12

30. The average of 10 numbers, a student, by mistake, wrote 64 in place of a number 46 and got his correct average 50. The correct average of the given numbers is:
(a) 48.2 (b) 48.3
(c) 49.1 (d) 49.3

31. If the average of 20 observations x_1, x_2.....x_{20} is y, then the average of x_1–101, x_2–101, x_2–101.....x_{20}–101 is :
(a) y - 20 (b) y -101
(c) $20y$ (d) $101y$

32. The average of 27 numbers is 60. If one number is changed from 28 to 82, the average is :
(a) 56 (b) 58
(c) 62 (d) 64

33. The mean value of 20 observations was found to be 75, but later on it was detected that 97 was misread as 79. Find the correct mean.
(a) 75.7 (b) 75.8
(c) 75.9 (d) 75.6

34. The average of 7 consecutive numbers is 20. The largest of these numbers is :
(a) 24 (b) 23
(c) 22 (d) 20

35. Eight consecutive numbers are given. If the average of the two numbers that appear in the middle is 6, then the sum of the eight given numbers is:
(a) 54 (b) 64
(c) 36 (d) 48

36. The average of seven numbers is 18. If one of the numbers is 17 and if it is replaced by 31, then the average becomes :
(a) 21.5 (b) 19.5
(c) 20 (d) 21

37. If the mean of 4 observations is 20, when a constant 'C' is added to each observation, the mean becomes 22. The value of C is:
(a) 6 (b) -2
(c) 2 (d) 4

38. The mean of 11 numbers is 35. If the mean of first 6 numbers is 32 and that of the last 6 numbers is 37, find the sixth number :
(a) 28 (b) 29
(c) 30 (d) 27

39. The average weight of the 8 oarsmen in boat is increased by $1\frac{1}{2}$ kg when one of the crew who weighs 60 kg is replaced by a new man. The weight of the new man in kg is :
(a) 70 (b) 68
(c) 71 (d) 72

40. Average of first five odd multiples of 3 is :
(a) 12 (b) 16
(c) 15 (d) 21

41. If the average of x numbers is y^2 and that of y number is x^2 then tha average (x + y) number is:

(a) $\frac{x}{y}$ (b) x - y

(c) xy (d) $|x-y|$

42. If a,b,c,d,e,f,g are seven consecutive even integers, then what is their average ?

(a) $\frac{abcdefg}{7}$

(b) 7(a + b + c + d + e + f + g)

(c) a + 6

(d) a + 4

43. A car owner buys petrol at Rs.60, Rs.80, Rs.48 per litre for three successive years. What approximately is the average cost per litre of petrol if he spends Rs.12000 each year?

(a) Rs.50 (b) Rs. 60

(c) Rs. 75 (d) Rs.80

44. The batting average for 40 innings of a cricket player is 40 runs. His highest score exceed his lowest by 56. If these two innings are excluded, the average of remaining 38 innings is 38 runs. The highest score of the player is (in runs):

(a) 106 (b) 50

(c) 104 (d) 52

45. A cricketer has a certain average for 10 innings. In the eleventh innings, he scored 158 runs, thereby increasing his average by 10 runs. His new average is :

(a) 58 (b) 68

(c) 48 (d) 78

46. A batsman has a certain average in 11 innings. In the 12^{th} innings, he scored 90 runs and his average decrease by 5. After the 12^{th} innings what his average?

(a) 150 (b) 145

(c) 155 (d) 140

47. A man buys a certain number of oranges at 20 for Rs.60 and an equal number at 30 for Rs.60. Find average rate of a orange?

(a) Rs. 2.5 (b) Rs. 2.4

(c) Rs. 2 (d) Rs. 3

48. The average monthly salary of the workers in a workshop is Rs.8,500. If the average monthly salary of 7 technicians is Rs. 10,000 and average monthly salary of the rest is Rs. 7,800, the total number of workers in the workshop is:

(a) 18 (b) 20

(c) 22 (d) 24

49. A lady bought 13 tops of Rs.50 each, 15 pants of Rs 60 each, 12 pairs of shoes at Rs.65 a pair and 20 pairs of socks at Rs.16 a pair. Find the average value of a article :

(a) Rs.52 (b) Rs.$44\frac{1}{6}$

(c) Rs.54 (d) Rs.55

50. If constant distance from home to school is covered by a boy at 10km/hr. The boy comes back the same distance at 15km/hr. Find his average speed during the whole journey

(a) 12.5km/hr (b) 12km/hr

(c) 10km/hr (d) 13km/hr

Solution

1. (a) $S = n^2 = 13^2$

average = n = $\boxed{13}$

2. (a) sum = $\frac{n(n+1)(2n+1)}{6n}$

Average = $\frac{(n+1)(2n+1)}{6}$

$= \frac{18' 35}{6} = \boxed{105}$

3. (b) 9th observation
= (9 × 87) – (5 × 79 + 3 × 92)
= 783 – (395 + 276)

= 783 – 671 = $\boxed{112}$

4. (d) Last two data
= (7 × 34) – (3 × 28 + 2 × 47)
= 238 –178 = 60

\ average = $\frac{60}{2}$ = $\boxed{30}$

5. (c) Sum (7th, 8th, 9th)
= (9 × 79) – (2 × 75 + 4 × 87)
= 711 – 498 = 213
7th + 8th + 9th = 213
(x –4) + (x + 1) + (x)
= 213
Þ 3x – 3 = 213

$\boxed{x = 72}$

6. (a) Let 6th number = x
7th number = x + 4
8th number = x + 7
(6th + 7th + 8th) = 160 – (31 + 64)
$\underline{x} + \underline{x+4} + \underline{x+7} = 65$
x = 18

\ 8th = x + 7 = $\boxed{25}$

7. (b) Sum = $30 \times 14\frac{4}{12}$ or $30 \times 14\frac{1}{3} = 30 \times \frac{43}{3} = 430$

New sum = $35 \times 13\frac{3}{4} = \frac{35' 55}{4}$

Sum (excluding four)

$= \left(430 + 9\frac{11}{12}\right)$

\ Sum (remaining 4)

$= \frac{35' 55}{4} - 430 - 9\frac{11}{12} = \frac{496}{12}$

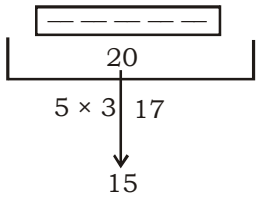
\ average = $\frac{496}{12' 4}$

$= \frac{124}{12} = \boxed{10\frac{1}{3}}$

8. (c) [1, 2, ...9] + [Boy]
30 30 30 A + $\frac{72000}{9}$
30 $\underline{A + 8000}$

\ Boy = 8000 + 30 + 72,000
= Rs. 80,030

9. (b)



age of child = 17 – 15 = 2 years

10. (a) M F S Bride Baby = 36
48 18

average = $\frac{36}{2}$ = 18

Bride + baby = 36
31y + 5y
At time of marriage, bride
= 31 – 6 = 25 years

11. (c) M + T + W + Th = 31 × 4
$\underline{-(T + W + Th + F) = 29.5 \times 4}$
M – F = 6

$37\frac{1}{2}\% = \frac{3}{8}$

\ M : F = 11 : 8

\ $\boxed{M = 22°C, F = 16°C}$

12. (b) M + T + W = 37 × 3
$\underline{-T + W + Th = 34 \times 3}$
M – Th = 9

$\frac{Th}{M} = \frac{4}{5} = \frac{36}{45}$

= 36°C

13. (c) Orig inal = 42x
New = 55(x – 3)
42x + 30 = 55x – 165
13x = 195 Þ x = 15
\ original = 42×15= 630

14. (d) Let nos. be a, b, c and d.

$\frac{a+b+c}{3}$ + d = 29
(a + b + c + a) + 2d = 29 × 3
(29 + 23 + 21 + 17 – 90)

a + b + c + d = $\frac{90}{2}$ = 45

\ 45 + 2d = 87
d = 21

\ other number = $\frac{23' 3 - 45}{2}$ = 12

Other = $\frac{21' 3 - 45}{2}$ = 9 and

Other = $\frac{17' 3 - 45}{2}$ = 3

15. (c) $\frac{a+b}{2} + c = 24$

Þ a + b + 2c = 24 × 2

$\frac{b+c}{2} + a = 20$ Þ $2a + b + c = 20 \times 2$

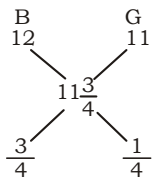
$\frac{a+c}{2} + b = 18$ Þ $\underline{a + c + 2b = 18 \times 2}$

4(a + b + c) = 62 × 2
a + b + c = 31
\ c = 17, a = 9, b = 5

16. (a) 480 × 12 + x × 11 = $11\frac{3}{4}$,

or

[480] [____] → [average]



= 3 : 1

\ girls = $480 \times \frac{1}{3} = 160$

17. (c) $\frac{12.4x+52}{x+10} = (12.0)$

$12.4x + 52 = 12x + 120$

$x = 170$

wickets at present = $\boxed{180}$

18. (d) Let average be x

$16x + 87 = 17(x + 3)$

$16x + 87 = 17x + 51$

$x = 36$

\ New average = 36 + 3 = 39

19. (a) Runs = 12.4x

$\therefore \frac{12.4x+26}{x+5} = 12$

$12.4x + 26 = 12x + 60$

$0.4x = 34$

$\boxed{x = 85}$

Current wickets = 85 + 5 = $\boxed{90}$

20. (b) $\frac{43x+42+36.5+39+42.5}{(x+4)}$

$= 42.5$

$43x + 160 = 42.5x + 170$

Þ $0.5x = 10$ Þ $x = 20$

therefore, number of students = $\boxed{24}$

21. (a) $30 \times 42 = 1260$

$28 \times 40 = 1120$

\ highest + lowest = 140

120 20

highest – lowest = 100

Highest score = $\frac{140+100}{2}$

= 120

22. (b) The average of last 2 Innings.

$= \frac{3.95 \times 6 - [(3.4 \times 2) + (3.85 \times 2)]}{2} = 4.6$

23. (c) Let the averages of 16th innings = x

Let the average after 15th innings = $x - 3$

$16x = 15(x - 3) + 60$

$x = 15$

24. (b)

$\frac{n + (n+1) + (n+2) + (n+3) + (n+4)}{5} = m$

n+2=m Þ n = m-2

Series is m–2, m–1, m, m+1, m+2, m+3, m+4, m+5

Average

$= \frac{(m-2) + (m-1) + \dots + (m+4) + [m+5]}{8}$

= m +1.5

Which is 1.5 more than m

25. (c) $x + (x - 12) + 117 + 15 = 72.5 \times 4$

$2x = 290 - 117 - 15 + 12 = 170$

$x = 85$

26. (d) $x + x + 2 + x + 4 + x + 6 + x + 8 + x + 10 + x + 12 + x + 14 + x + 16 = 9 \times 53$

$\Rightarrow 9x + 72 = 477$

$\Rightarrow 9x = 477 - 72 = 405$

$\Rightarrow x = \frac{405}{9} = 45$

27. (b) Total no. of odd no. from 1 to 100= 50

Required average = 50

28. (b) $x + x + 1 + x + 2 + x + 3 + x + 4 + x + 5 + x + 6 = 26 \times 7$

$\Rightarrow 7x = 182 - 21 = 161$

$\Rightarrow x = \frac{161}{7} = 23$

29. (c) Total no. of workers in factory $= \frac{1534}{118} = 13$

30. (a) Correct total number 10 numbers

$50 \times 10 - 64 + 48 = 482$

average = $\frac{482}{10} = 48.2$

31. (b) Required average

$= \frac{x_1 + x_2 + \dots . x_{20}}{3} - \frac{101' 20}{20} = y - 101$

32. (c) Difference of numbers

= 82 – 28 = 54

Required average

$= 60 + \frac{54}{27} = 62$

33. (c) difference = 97 – 79 = 18

original average $= 75 + \frac{18}{20}$

= 75.9

34. (b) Let 7 consecutive numbers is:

$x + x + 1 + x + 2 + x + 3 + x + 4 + x + 5 + x + 6 = 20 \times 7$

$7x + 21 = 140$

$x = 17$,

largest numbers $x + 6 = 117 + 6 = 23$

35. (d) Let's the 1st no is x

$\therefore x + 3 + x + 4 = 2 \times 6$

$\Rightarrow 2x + 7 = 12$

$\Rightarrow 2x = 5 \Rightarrow x = \frac{5}{2}$

$\therefore x + (x + 1) + \dots\dots\dots + (x + 7) = 8x + 28$

$= 8 \times \frac{5}{2} + 28 = 20 + 28 = 48$

36. (c) Difference = 31 – 17 = 14

$\therefore$ Required average

$= 18 + \frac{14}{7} = 20$

37. (c) $4C = 22 \times 4 - 20 \times 4$

$= 88 - 80 = 8$

$\Rightarrow C = \frac{8}{4} = 2$

38. (b) 6^{th} no. is= $6 \times 32 + 6 \times 37 - 11 \times 35$

= 192 + 222 – 385 = 29

39. (d) weight of new man

$= 60 + 8' \frac{3}{2}$

= 60 + 12 = 72 kg

40. (c) Average of first five odd multiples of 3

Þ $\frac{3(1+3+5+7+9)}{5} = \frac{3' 25}{5} = 15$

41. (c) sum = average × total observations

$Sx = y^2 \times x = xy^2$

$Sy = x^2 \times y = x^2y$

$Sx + Sy = xy^2 + x^2y = xy(x + y)$

Avergae = $\frac{xy(x+y)}{x+y} = xy$

42. (c)

$a = x$, $b = x + 2$, $c = x + 4$, $d = x + 6$, $e = x + 8$, $f = x + 10$, $g = x + 12$

Average =

$$\frac{x+x+2+x+4+x+6+x+8+x+10+x+12}{7}$$

$= x + 6$

i.e. $= a + 6$

43. (b) uses of petrol in 1st year

$$=\frac{12000}{60}=200 \text{ litre.}$$

uses of petrol in 2nd year

$$=\frac{12000}{80}=150 \text{ litre}$$

uses of petrol in 3rd year

$$=\frac{12000}{48}=250 \text{ litre}$$

average cost

$$=\frac{12000\times 3}{200+150+250}=\text{Rs.}60$$

44. (a) $40 \times 40 - 38 \times 38$

$= 1600 - 1444 = 156$

Sum of these 2 innings = 156

i.e. $x + x + 56 = 156$

$2x = 100$

$x = 50$

Highest score = 50 + 56 = 106

45. (a) Let the average of 10th innings

$= x$, then

$$=\frac{10x+158}{11}=x+10$$

$10x + 158 = 11x + 110$, $x = 48$

New average = 48 + 10 = 58

46. (b) Let the average in 11th innings = x

The average of after 12th match

$= x - 5$

$12(x - 5) = 11x + 90$

$x = 150$

Hence, New average = 150-5 = 145

47. (a) 20 orange of = 60

then 60 orange of = 180

30 orange of = 60

then, 60 orange of = 120

Average

$$= \frac{180+120}{60+60} = \frac{300}{120} = \text{Rs.}2.5$$

48. (c) Let the workers in the workshop = x

Then,

$8500 \times x = 1000 \times 7 + 7800(x-7)$

$8500 \times x - 7800 \times x = 1000 \times 7 - 7800 \times 7$

$700x = 2200 \times 7$

$x = 22$

49. (b) Average cost

$$=\frac{13'\ 50+15'\ 60+12'\ 65+20'\ 16}{13+15+12+20}$$

$$= \frac{650+900+780+320}{60}$$

$$= \text{Rs.}44\frac{1}{6}$$

50. (b) Average speed

$$=\frac{2\times 10\times 15}{10+15}=12 \text{ km/hr}$$